had been stripped (or rather had stripped itself) of both characters. Moreover, Convocation would lose all importance, and could not possibly retain the only powers it at present possesses, of nominating certain members of the Senate and accepting new charters. The Senate would do its sole work, of choosing examiners and revising their lists, as a small body of salaried Government officials (probably in South Kensington), and no claim would remain for the unconnected waifs and strays who passed the examinations to take any part in the matter. No charters would be requisite, nor any apparatus of library or Senate House, laboratory or lectures. In fact all the efforts of the past twenty years would be thrown away.

Nevertheless, if the two original Colleges of the University secede, they will find the name, the prescription and the influence of the Senate too strong for them to, wrest its powers from the present holders.

The medical corporations have far more influence and far stronger grounds; for the three or four strongest of them are organised as complete Colleges in their own Faculty, and give a more academic training to their students in medicine than either University or King's College does to students in arts, science, or laws. They might, perhaps, succeed in gaining power to grant degrees where the others failed, but this could only be by showing that no reasonable concessions were made to their just demands by the existing University.

Hence it will be seen that the present University of London, its two original Colleges, and the principal medical schools, have each of them the power of checking, if not of checkmating, each other's plans. Even if they agreed to urge their several objects without opposition to each other, the result would be three Universities existing together in London. One would have become a mere examining Government Board; another would consist of two ill-endowed and ill-consorted Colleges, without residence, with slender endowments, and compelled to extend their proper functions by attempting the instruction of partial students; the third would be a combination of two large professional corporations with Colleges in one faculty only, two or three well equipped, several very poorly furnished, and all of necessity rivals, scattered over the country, none of them endowed, and only able by the terms of their existence to give a second-rate degree.

What hope would there be of any one of these three so-called Universities even approximating to what a University of London should be? Each would be strong enough to prevent the others succeeding; none would be strong enough to absorb its rivals. Meanwhile the higher education would deteriorate rather than improve, endowments would be indefinitely postponed, and the prospects of the University laboratories, museums, and libraries of London sending out worthy contributions to the progress of human knowledge would become poor indeed.

When the several separate movements now in progress are checked by the necessity of obtaining the sanction if not the support of Government, we may hope that broader views will be taken of what is best for the community, and more sober views of what is practically attainable. Believing in the public spirit and the good sense of our countrymen, we have little fear but that, with patience and mutual concessions, a combined result will be obtained which will benefit all the parties to the new confederation, and promote the only interests with which this journal is concerned—the national interests of learning and of science.

A JUNIOR COURSE OF PRACTICAL ZOOLOGY

A Junior Course of Practical Zoology. By A. Milnes Marshall, M.D., D.Sc., M.A., F.R.S., Professor in the Victoria University, assisted by C. Herbert Hurst. (London: Smith, Elder, and Co., 1887.)

NOTICE will be found in the columns of this journal (vol. xxxiii. p. 242) of the second edition of a small laboratory hand-book by the senior author of the above-named work, entitled "The Frog; an Introduction to Anatomy and Histology." In the preface to that we read: "The second instalment of the work, containing directions for the examination and dissection of a number of animals chosen as types of the principal zoological groups, is in active preparation, and will be published shortly." The author further acknowledges "valuable help from Mr. C. H. Hurst, Assistant Lecturer in Zoology in the College." Mr. Hurst now appears as junior author, and, although the work here under review differs in some important respects from its predecessor above referred to, we presume that it is the promised "second instalment."

The volume opens with an introduction, confined to the consideration of practical hints as to methods of working and manipulation; then follow fifteen chapters, each devoted to some one type of organisation, and the whole closes with an appendix, dealing with the uses and methods of preparation of reagents. We have, in all, a most successful and important book of 421 pages.

The work is largely akin, in its more salient features, to many of its predecessors; but it stands alone in respect of certain methods of treatment, to which we shall refer duly. Thick type has been employed throughout for the various headings, and the authors adopt the plan, introduced in the aforenamed smaller work, of printing the directions for dissection in italics. In dealing with the complications of the vertebrate skeleton, they have availed themselves of the printer's art, by way of restricting descriptions of homologous sets of elements to corresponding and distinct types.

The introduction is a model of perspicuity, and so well set as to render it impossible for the veriest tyro to obtain anything but full benefit therefrom. The advice given is sound in the extreme, and such as could only have embodied the results of a long and well-tried experience. The directions for injecting blood-vessels are, perhaps, a little too elaborate, being worthy of the *préparateur's* art, rather than of the ordinary beginner; this, however, is a small defect on the right side. We note that under the section on microscopical examination all reference to the micrometer has been omitted. Directions for measuring objects under observation should certainly be added to the next edition.

The several chapters into which the book is subdivided differ most conspicuously from those of certain earlier works in the fact that the more general statements made are diffused throughout the whole, except so far as they serve to define an animal under consideration, or to set forth the predominant characters of a given system of parts. The chapters on Protozoa and the Leech may be consulted as fair examples. In the latter, advantage is taken of this method to force upon the student, somewhat prematurely, the fact that (p. 36) "the segmental arrangement affects in a marked manner the nervous, excretory, and reproductive systems, and, to a less degree, the circulatory and digestive organs," and the deduction that "it appears to result from a definite arrangement of parts which, in the ancestors of the leeches, were scattered irregularly through the body, much as in *Fasciola*" (dealt with in the previous chapter).

By way of contrast with its predecessor on the Frog, this volume is shorn of much that is histological. In the earlier work a special feature was made of this branch, but here it by no means receives that amount of attention which its importance demands. A start in this direction might well be made with the lung-structure of the bird and mammal, especially in view of the statement made (p. 389) concerning the mechanism of respiration in the former.

The detailed descriptions of the various animals chosen are, for the most part, exceedingly well rendered. A slight ambiguity has crept in in one or two places, and the descriptions of the vascular systems of the mussel and snail might well be amplified.

No portions of the descriptive text stand more in need of revision than those relating to the digestive glands. These are, in Anodon, Helix, Astacus, and Amphioxus, designated under the old term "liver." A certain amount of justification is forthcoming in the last-named case, in view of its blood-supply; but in the three first-named the striking results of recent research, which call for no comment here, ought at least to be suggested in the term "digestive gland" or "hepato-pancreas." While we would see, thus, the substitution of a modern term for one well-nigh obsolete, we would desire the withdrawal of the terms "kidney" and "ureter" as applied to the excretory organs of the Invertebrata. In the case of the mussel, in which a portion of that which our authors term "ureter," is glandular and secretory, the terminology as restricted by them becomes misleading.

Conspicuous among the novelties offered us are certain words new to students' books. The volume is fully up to date, and its authors are to be congratulated on having produced the first book for students in the language, which describes the receptaculum ovorum of the worm. As regards pure nomenclature, it is worthy of note that they have embodied, in describing the pterylosis of the bird's wing (p. 386), that introduced by Prof. Flower so recently as February 1886, in a lecture delivered at the Royal Institution; and necessitated by the splendid work in which he is being assisted by Mr. R. S. Wray. (The description of the barbules on the same page is in error.)

In dealing with the appendages of the insect, the nomenclature customarily applied to the crustacean limb is utilised. To this extension we heartily assent. On turning to the crustacean itself, we meet with an innovation far less deserving of support. Our authors, faithful to precedent, reduce the body of the decapod crustacean to twenty segments; but in so doing they discard the ophthalmic somite of their seniors, and press the telson into the service. This introduces a serious difficulty when the nervous system is taken into consideration, and a still more formidable one as concerns the homology of the eye-stalk. That is passed over in comparative silence, and, although we are not told so in as many words, it is clear that they regard it as in no way serially homologous with the appendages. The condition of the visual organ in the lower Crustacea and other arthropods, taken in conjunction with the facts adduced by Brandt and others in the morphology of the insect's eye, render it probable that the above view may turn out to be correct. Nor must it be forgotten that Boas has challenged (*Morpholog. Jahrbuch*, vol. viii.) the accepted interpretations of the antennule. There are, however, two sides to this question, and it is important to observe that M. Alphonse Milne-Edwards has recently described a decapod (*Palinurus penicillatus*, *Comptes rendus*, vol. lix., 1864), in which one ophthalmite was for the most part multiarticulate and antenniform. This remarkable fact is the more striking in view of the reversion to the antenniform type of certain post-oral appendages, seen in *Mastigopus* and *Apseudes* among the Crustacea, and so well known in the scorpion-spiders; whatever may be its precise significance, it is clear that the question of general homology of the eye-stalk, with which we are here especially concerned, is far from settled. The introduction of so sweeping a change into a book for juniors without due comment is, under these circumstances, a false step, especially when it is considered that the precise converse is stated in all other books current.

Equally unjustifiable, in that it affects another debatable question, is the statement (p. 379) that the bird's pre-pubic process corresponds to the pubis of mammals. Clear proof of this is not forthcoming. The student's hand-book is not the place for such dogmatisms: if asserted, they should be well qualified, and put as alternatives.

The retention of the old nomenclature for the bird's air-sacs, with its atrocious "*thoracic*" element, is disappointing; the substitution (p. 220) of "pericardio-*cœlomic*" for the well-tried pericardio-peritoneal canal of the fish is as misleading as it is misjudged; while that of "*connective*" for the time-honoured commissure is, on the whole, inadvisable. We live in a word-mongering age. New terms which do not mark a turning-point in advance, or at least the era of a new discovery, are stumbling-blocks, unless introduced by way of replacing irrelevant or absolutely fantastic precursors. Such is not the case with those here under consideration. Our position is somewhat that of the port-bound crew, in dread of being stranded on their own beef-bones.

Attention has been already directed to the diffusion of the more general matter throughout the text. This has been effected very successfully, and in well-chosen language deserving of the greatest praise; but we dissent from the method adopted. It will be generally admitted that Huxley and Martin's "Elementary Biology" dissipated for students of the subject, once and for ever, the subtle "cram"; and subsequent writers working along similar lines have, as was to be expected, attempted to improve upon the plan therein created, each after his own lights. Messrs. Marshall and Hurst have aimed at producing a work which they hope "may meet the wants of those who desire to obtain a practical acquaintance with the elements of animal morphology, and who find the existing manuals insufficient for their purpose." It is to be assumed that they have been especially mindful of the needs of their own College, but the work also covers most of the requirements for the elementary examinations of other schools, and we presume the authors would wish it a general circulation among pure devotees. This said, we proceed to inquire into the method of treatment, and find with much regret that, at the outset, such deductions as are incorporated in the text almost invariably precede the description of those facts upon which they are based. For example: on p. 141, the alimentary canal of the crayfish—itself complicated—is ushered in with the words that it is "a tube running in a nearly straight line from mouth to anus. Of this tube, the middle portion, or mesenteron, which is very short, is alone formed from the primitive alimentary tract of the embryo, and the 'liver' is an outgrowth of it. The stomatodæum, or anterior portion of the canal and the proctodæum, or hind portion, which together form almost the whole length of the canal, are both formed by invagination of the external surface of the body; and both have a chitinous lining which is continuous, at the mouth and anus respectively, with the chitinous external covering of the body." Then follows the detailed description. Again, the podical plates of the insect are twice mentioned before the student is told how to find them. The tympano-Eustachian passage of the bird is (p. 414) similarly treated; and here the generalisation given should, if introduced at all, have been rather inserted when dealing with the mammal, on the supposition that, as can hardly be doubted, the authors would have the student work over the animals in the order of presentation. In such cases as the dogfish skeleton (p. 198), the limbs of the mammal and bird (pp. 287 and 376), and the enumeration of the differences between Amphioxus and the higher Vertebrata (p. 168), the system is tolerable, by way of clearing the ground and exciting interest. When, however, as in the first-cited instance, the crowning triumph of the student's labour is thus anticipated and his reward forestalled, deduction on reflection upon his work falls flat, and one of the chief aims of the whole system is lost. This, to our thinking, constitutes the gravest defect in this valuable work.

In describing the rabbit's liver (pp. 306-7), the lobes are rightly enumerated, but the student is not informed upon what grounds the customary nomenclature is adopted. In this, and one or two other instances, explanatory clauses are needed, but not given.

The illustrations are excellent, reflecting the greatest credit upon all concerned, and artistic merit such as that of Fig. 28 cannot fail to strike the reader. Fig. 27 is unnecessarily complicated, too much having been attempted. The beautiful new figures of Amphioxus are especially deserving of praise; but more of them are wanted, in order to do justice to the excellent description which they illustrate. Comparison of this chapter with that on the liver-fluke calls for this increase in number, in view of the relative chances of the student's procuring specimens.

Being mindful of the difficulties of preservation of Amphioxus, it is to be regretted that, while full directions are given for cutting sections, those for preservation, which have led up to the splendid results incorporated in this work, should have been omitted. This, the more so; as the animal is to be obtained in the Channel Islands, and is therefore within reach of the native student (a fact which should be mentioned in the text).

In dealing with the higher vertebrates, the authors follow one of their predecessors in first describing the skeleton. We doubt the advantages of this system, especially as in this work we have an "almost entire omission" of the muscular system, held to be "of subordinate educational value." The book, taken as a whole, is highly welcome and most admirable. It is provided with an exceedingly good index, and presented in a form demanding our sincere thanks alike to authors, printers, and publishers. Taking it, in conjunction with its predecessors, into account, we have to congratulate the student of zoology upon his accessions. This volume yields ample return for the immense labour which its authors have bestowed upon it; it is well worthy of the school which they represent, and of its prototype above named.

It is significant that the only typographical errors which we have detected should be the occasional absence of **i** and **r**. This fact might repay a careful research at the hands of the printer.

The authors state in their preface that "corrections or suggestions from those who use the book will be very gratefully received." Having dealt above with the more important matters which occur to us, we append comments on some of the more obvious among those of wholly minor importance, noted in perusing the volume.

Before proceeding to do this, we wish to call attention to two matters of exceptional note: the first, the respiratory folds of the lining membrane of the fish's mouth; the second, the attachment of the styloid element of the rabbit's hyoid-arch to the paramastoid process. It is indeed remarkable, seeing that these structures are of such common occurrence, and that they have been presented to every native student of recent years, that there is not yet a text-book in the language, or out of it for the matter of that, in which they are described. This is the more surprising in the case of the respiratory folds, in consideration of their general development among the gnathostomatous fishes.

The Hydra. We cannot accept the description of the supporting lamella as the "mesoderm"; it is misleading if not erroneous.

The Leech. There is no mention of the intermediary nerve.

The Earthworm. The description of the histology of the nervous system needs amplification, especially as concerns the distribution of the nerve-cells, by way of bringing out the nature of comparison with the other types. The account given of the blood-vessels is incomplete; the sub-intestinal trunk (described by Horst, *Niederland. Tidschr.* vol. xxxvii., and others) is not mentioned, that term being applied, in error, to the supra-neural vessel.

We strongly dissent from the description given of the œsophageal glands. Further investigation is necessary before we can accept their subdivision into the two categories here proposed. By our contemporaries, as by ourselves, much variation has been observed in their number and relationships, and we have seen examples in which all contained calciferous concretions and opened into the gut.

The Edible Snail. In describing the liver, the terms left and right have been transposed. Mention should be made of the salient features, in structure and distribution, of the teeth of the radula.

The Lancelet. To the description of the supposed excretory canals of Lankester (p. 178) there should be added that of the much more likely one of Hatschek (*Zool. Anzeiger*, vol. vii.). We accept the senior author's views on oviposition, but Quatrefages' observation should have been mentioned unless finally disproved.

The Dogfish. The remarks on ossification (p. 194) are erroneous. The statement (p. 211) that the labial cartilages probably "belong to the same category as the extra-branchials" is unfortunate, in view of Dohrn's discovery that the latter are displaced rays of the gill-septum.

In describing the relative positions of the roots of the spinal nerves (p. 252) the terms dorsal and ventral have been transposed. The description is irreconcilable with Fig. 36.

The Rabbit. The description of the shoulder-girdle needs revision, with respect to the coracoid element and the relations of the clavicle. The statements concerning the morphological value of the pisiform would be better free of bias, in view of the tendency of current research. In describing the pelvic girdle, mention of the cotyloid bone has been omitted, and consequently we find the statement that the pubis forms a portion of the acetabulum (cf. Parker, P.Z.S., 1882; also Leche and Krause, *Internat. Journ. of Anat. and Hist.*, vols. i. and ii.). The Eustachian cartilage is deserving of note.

The structural differentiation of the lining membrane of the stomach and base of the rectum need description. The duct of the infra-orbital gland is insufficiently noted; the description of the cæcum needs revision. It is interesting to find that the authors have not discovered the ducts of the rectal glands.

The statement explanatory of the uterus masculinus must be withdrawn or considerably modified, in face of Kolliker's belief that it is a derivative of the Wolffian ducts ("Entwickelungsgesch.," 2nd edition, p. 981). Its structural features and relationships are much more intelligible on this view.

The description of the fifth ventricle needs modification, and that of the spiral valve of the portal vein might well be inserted (Hyrtl, *Sitzb. Akad. Wien.*, 1879).

The Fowl and Pigeon. Note of the more important muscles of the syrinx, as also of the larynx of the mammal, might advantageously be added.

The ventricle of the olfactory lobe is not mentioned, either in the bird or rabbit.

In conclusion, we would wish to draw attention to the satisfactory manner in which the authors have apportioned the several chapters of this successful volume in accordance with their respective value—no light task of its kind. The thoroughness of the book is one of its most striking features. G. B. H.

EMBRYOGENY OF THE ANTHROPOID APES

Recherches Anatomiques et Embryologiques sur les Singes Anthropoides. By J. Deniker. (Paris, 1886.)

THIS work was presented to the Faculty of Science of Paris as a thesis for the degree of Doctor of Natural Science, and was approved of by it as sufficiently meritorious to warrant the bestowal of that degree on the author. It consists essentially of a comparison of the fœtus of the gorilla and of the gibbon with that of man, and also with young and adult anthropoids.

The embryogeny of the anthropoid apes, notwithstanding the great interest which it presents, is unfortunately little known, probably owing to the difficulties of obtaining embryo specimens. The author has therefore done well to utilise the opportunity which presented itself to further our knowledge of the subject, by publishing the descriptive anatomy of the fœtus of the gorilla and the gibbon which he has had the opportunity of studying. His account of the anatomy of these specimens is rendered more valuable by the comparison he has made between them and the human embryo, and between them and the adult animals of their respective species.

The work begins by a careful description of the external characters of the embryo gorilla and gibbon: the attitude, external form, coloration, and integumentary characters are respectively detailed with much care. The placenta and fœtal membranes were fortunately preserved with the fœtus of the gibbon, and their characters are described and figured, but unfortunately these parts were not obtained with the young gorilla, and so could not be described. A *résumé* is given of the observations of Owen, Huxley, Turner, and others on the placentation of apes and monkeys. The next section contains an account of the weight and dimensions of the various parts of the body of the respective fœtûs. Of the former little can be said on specimens preserved in alcohol, but the dimensions of the entire body, the head, trunk, and extremities, are carefully detailed in a tabular form, with the corresponding measurements in the human fœtus at the fourth and fifth month, and of the adolescent gorilla. A second table shows the relations which the dimensions of the several parts bear to the length of the body, and a third table those between the trunk and the extremities, and between the different segments of the latter. These tables show several interesting points in regard to the proportions which the various parts of the body bear to one another in the course of development. During the second half of intra-uterine life the upper extremity in the anthropoids is much shorter in relation to the length of the trunk than in the adult, and the same relation holds good with respect to the length of the fore-arm as compared with that of the upper arm. In the human fœtus of the same age, on the other hand, the upper extremity presents almost the same proportions that it does in the adult. The relative length of the superior extremity as compared with that of the inferior changes likewise considerably in the course of development. Thus in man during the earlier stages of embryonic life the lengths of both extremities are almost equal, but in the anthropoid apes, at an early period even, the length of the superior limb exceeds that of the inferior.

The skeleton of the fœtus is next compared with that of the adult anthropoids. In treating this part of the body the author naturally devotes considerable attention to the various parts of the skull, and has drawn up several valuable tables of its measurements in the fœtus and adult. The second chapter on the skeleton is devoted to a description of the vertebral column, and the limb bones; while the third treats of the dimensions of the individual bones. The points of ossification of the skull are found to be the same in man and the anthropoid monkeys, but the rate of their development in the monkeys in many important respects differs from what obtains in man. In general it may be stated that the frontal region ossifies more rapidly, whereas the occipital